



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/821,648

03/29/2001

Zheng J. Geng

40169-0031

5727

20480

7590

06/22/2006

STEVEN L. NICHOLS
RADER, FISHMAN & GRAVER PLLC
10653 S. RIVER FRONT PARKWAY
SUITE 150
SOUTH JORDAN, UT 84095

EXAMINER

REKSTAD, ERICK J

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 06/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/821,648
Filing Date: March 29, 2001
Appellant(s): GENG, ZHENG J.

MAILED

JUN 22 2006

Technology Center 2600

Steven L. Nichols
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 19, 2006 appealing from the Office action mailed September 21, 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,118,474	Nayar	9-2000
5,870,135	Glatt et al.	2-1999

4,908,874	Gabriel	3-1990
6,226,035	Korein et al.	5-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,118,474 to Nayar in view of US Patent 5,870,135 to Glatt et al.

[claim 1]

Nayar teaches the method for generating a selectable perspective view of a portion of a hemispherical image scene, comprising the steps of:

Acquiring an omnidirectional image on an image plane using a reflective mirror that satisfies a single viewpoint constraint and an image sensor (Col 9 Lines 49-53);

Defining a perspective viewing window based on configuration parameters (Col 7 Lines 62-65 and Col 10 Lines 56-65);

Art Unit: 2621

Mapping each pixel in the perspective window with a corresponding pixel value in the omnidirectional image on the image plane using the configuration parameters (Col 10 Line 55-Col 11 Line 55 and Col 12 Lines 25-35).

Nayar does not teach the use of a look-up table based on the configuration parameters.

Glatt teaches the use of a look-up table for storing pixel for displaying a non distorted sub image of an original hemispherical image. The look-up table allows for the pixels corresponding to those calculated coordinates to be fetched and displayed as if the image had been formed by the panning and tilting of a normal camera (Col 8 Lines 25-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of Nayar with the look-up table of Glatt in order to display an image as if it had been formed by the panning and tilting of a normal camera as taught by Glatt.

[claim 2]

Nayar further teaches the method of claim 1, wherein the configuration parameters defined in the defining step include at least one of a zoom distance defined as the distance from the focal point of said reflective mirror to said window, a pan angle defined as the angle between the x axis and a line through the focal point of said reflective mirror perpendicular to the x-y plane and a tilt angle defined as the angle between the x-y plane and a vector normal to said window (Col 10 Lines 55-65).

[claim 3]

Nayar further teaches the method of claim 2, wherein the defining step is conducted via a user interface through which a user enters data corresponding to at least one of a desired zoom distance, pan angle, or tilt angle (Col 7 Lines 62-65).

[claim 4]

Nayar further teaches the method of claim 1, wherein the mapping step includes the step of generating a mapping matrix by:

applying a ray tracing algorithm to each pixel in the perspective viewing window to determine a corresponding reflection point on the reflective mirror; and

projecting each reflection point to a focal point of the image sensor to determine the corresponding location in the omnidirectional image on the image plane (Figs. 4, 5 and 6)

[claim 5]

Nayar further teaches the method of claim 4, further comprising the step of storing the mapping matrix in a module having a memory. (Fig. 1A item 125. Computers all have memory)

[claim 6]

Nayar further teaches the method of claim 1 wherein the step of defining a perspective viewing window defines the perspective viewing window as a panoramic viewing window. (Col 11 Lines 25-30).

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Glatt as applied to claim 1 above, and further in view of US Patent 5,790,181 to Chahl et al. and US Patent 3,988,533 to Mick et al.

[claim 7]

Nayar and Glatt teach the method of claim 1 as shown above. Nayar and Glatt further teaches the use of the system for surveillance purposes (Nayar: Col 1 Lines 25-30, Glatt: Abstract) Nayar and Glatt do not teach the use of motion detection.

Chahl, while he is not specific as to his motion detection means, clearly teaches that motion detection can be done in a panoramic surveillance system (Col 6 Lines 25-32). However, he does not specify how he does his motion detection. However, at the time the invention was made, it was well known in the art of surveillance, that in order to detect video motion, the conventional way was to compare subsequent video images and if a large enough difference in the images is detected, it is considered motion. As proof of the Examiners statements he includes Mick, see abstract.

Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art, to include motion detection capabilities of Chahl and Mick in the system of Nayar and Glatt in order to adapt it for use in the surveillance application as Nayar says it can be used for.

[claim 8]

Nayar further teaches the method of claim 7, comprising the steps of:
calculating the configuration parameters for the perspective viewing window from the anomaly;
and selectively focusing the perspective viewing window on the anomaly using the calculated configuration parameters (Col 10 Lines 32-64).

[claim 9]

Chahl further teaches the use of activating an alarm if at least a portion of the residual image exceeds a predetermined threshold (Abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the alarm activating method of Chahl in order to notify security of an anomaly such as an intruder.

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Glatt as applied to claim 1 above, and further in view of US Patent 5,686,975 to Baker.

[claim 10].

Nayar and Glatt teach the method of claim 1. Nayar suggests the use of the method for teleconferencing (Col 1 Line 26). Nayar and Glatt do not teach detecting a location of a sound source in the image scene; and adjusting the perspective viewing window based on the detected location of the sound source.

Baker discloses a teleconferencing imaging system that includes a panoramic imaging means including an audio detection circuit that can locate the source of a sound and image it (Abstract). Therefore, at the time the invention was made it was well known in the art, that imaging the source of a sound was desired, thus it would have been obvious to one of ordinary skill in the art, to include the audio detection system disclosed by Baker into the imaging apparatus of Nayar and Glatt for use with teleconferencing.

[claims 11 and 12]

At the time the invention was made, use of the internet for transmitting images was well known in the art. Once the image is processed as in the case of the current

invention, data is data, therefore it doesn't matter that the image came from an omni-directional imaging means. Never the less, while Nayar and Glatt are silent on use of the Internet, Baker teaches that teleconferencing involves transmitting both the audio and video data to a remote site for viewing (Col 1 Lines 16-17).

Since teleconferencing implies use of the phone system, and access to the internet is achieved via the phone network, it would have been obvious to one of ordinary skill in the art to transmit the image via a server or any computer capable of handling the job in order to provide a suitable teleconferencing system.

[claim 13]

The method of claim 1, further comprising the step of forming a two way transmission link between the image sensor and a remote display, wherein the two-way transmission link transmits at least one of the omni-directional image, the perspective viewing window, and an audio signal. (Teleconferencing is a two way transmission link.)

Claims 14 and 16-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar in view of US Patent 4,908,874 to Gabriel.

[claim 14]

Nayar teaches an imaging apparatus for generating a two dimensional image, comprising:

A reflective mirror configured to satisfy an optical single viewpoint constraint for reflecting an image scene (Col 9 Lines 49-53).

An image sensor responsive to said reflective mirror and that generates two dimensional image data signals to obtain an omnidirectional image on an image plane (Col 7 Lines 62-65 and Col 10 Lines 56-65); and

A controller coupled to the image sensor, wherein the controller defines a perspective viewing window (Col 9 Line 63-Col 10 Line 19). Nayar further teaches the mapping of each pixel in the perspective window with a corresponding pixel value in the omnidirectional image on the image plane using the configuration parameters (Col 10 Line 55-Col 11 Line 55 and Col 12 Line 25-35). Nayar further teaches the required transformations (zoom, pan) of the hemispherical scene to produce an image from a view point (Col 9 Lines 31-64, Fig 6). Nayar further teaches the use of a computer which is well known to contain memory (Fig. 1A item 125). Nayar does not specifically teach the memory for storing a mapping matrix for each of a plurality of sets of said configuration parameters in a parameter space, said controller using a said mapping matrix to perform mapping of pixels from said omnidirectional image into said perspective viewing window.

Gabriel teaches the use of matrices to perform transformations such as translation, contraction, expansion, rotation and perspective projection (Col 4 Lines 19-30, Col 7 Lines 5-64). Gabriel further teaches a complex transformation can be produced from the product of simpler ones Col 6 Lines 29-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to store the matrices of Gabriel in the memory of Nayar in order to perform a transformation without processor intensive calculations.

[claims 16, 17, and 20]

Nayar further teaches the apparatus of claim 14, wherein the mapping step includes the step of generating a mapping matrix by:

applying a ray tracing algorithm to each pixel in the perspective viewing window to determine a corresponding reflection point on the reflective mirror; and

projecting each reflection point to a focal point of the image sensor to determine the corresponding location in the omnidirectional image on the image plane (Figs. 4, 5 and 6)

[claim 18]

Nayar further teaches the apparatus of claim 14, wherein the configuration parameters defined in the defining step include at least one of a zoom distance defined as the distance from the focal point of said reflective mirror to said window, a pan angle defined as the angle between the x axis and a line through the focal point of said reflective mirror perpendicular to the x-y plane and a tilt angle defined as the angle between the x-y plane and a vector normal to said window (Col 10 Lines 55-65).

[claim 19]

Nayar further teaches the apparatus of claim 18, wherein the defining step is conducted via a user interface through which a user enters data corresponding to at least one of a desired zoom distance, pan angle, or tilt angle (Col 7 Lines 62-65).

[claim 21]

Nayar further teaches the apparatus of claim 14, wherein the step of defining a perspective viewing window defines the perspective viewing window as a panoramic viewing window. (Col 11 Lines 25-30).

[claims 22 and 23]

Nayar further teaches the apparatus of claim 14, further comprising the step of storing the mapping matrix in a module having a memory. (Fig. 1A item 125. Computers all have memory)

Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Gabriel as applied to claim 14 above, and further in view of US Patent 5,790,181 to Chahl et al. and US Patent 3,988,533 to Mick et al.

[claim 24]

Nayar and Gabriel teach the apparatus of claim 14 as shown above. Nayar and Gabriel further teaches the use of the system for surveillance purposes (Nayar: Col 1 Lines 25-30, Gabriel: Abstract). Nayar and Gabriel do not teach the use of motion detection.

Chahl, while he is not specific as to his motion detection means, clearly teaches that motion detection can be done in a panoramic surveillance system (Col 6 Lines 25-32). However, he does not specify how he does his motion detection. However, at the time the invention was made, it was well known in the art of surveillance, that in order to detect video motion, the conventional way was to compare subsequent video images and if a large enough difference in the images is detected, it is considered motion. As proof of the Examiners statements he includes Mick, see abstract.

Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art, to include motion detection capabilities of Chahl and Mick in the system of Nayar and Gabriel in order to adapt it for use in the surveillance application as Nayar says it can be used for.

[claim 25]

Chahl further teaches the use of activating an alarm if at least a portion of the residual image exceeds a predetermined threshold (Abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the alarm activating method of Chahl in order to notify security of an anomaly such as an intruder.

Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Gabriel as applied to claim 14 above, and further in view of US Patent 5,686,975 to Baker.

[claim 26].

Nayar and Gabriel teach the apparatus of claim 14. Nayar suggests the use of the method for teleconferencing (Col 1 Line 26). Nayar and Gabriel do not teach detecting a location of a sound source in the image scene; and adjusting the perspective viewing window based on the detected location of the sound source.

Baker discloses a teleconferencing imaging system that includes a panoramic imaging means including an audio detection circuit that can locate the source of a sound and image it (Abstract). Therefore, at the time the invention was made it was well known in the art, that imaging the source of a sound was desired, thus it would have been obvious to one of ordinary skill in the art, to include the audio

detection system disclosed by Baker into the imaging apparatus of Nayar and Gabriel for use with teleconferencing.

[claims 27 and 28]

At the time the invention was made, use of the internet for transmitting images was well known in the art. Once the image is processed as in the case of the current invention, data is data, therefore it doesn't matter that the image came from an omni-directional imaging means. Never the less, while Nayar and Gabriel are silent on use of the Internet, Baker teaches that teleconferencing involves transmitting both the audio and video data to a remote site for viewing (Col 1 Lines 16-17).

Since teleconferencing implies use of the phone system, and access to the internet is achieved via the phone network, it would have been obvious to one of ordinary skill in the art to transmit the image via a server or any computer capable of handling the job in order to provide a suitable teleconferencing system.

[claim 29]

The imaging apparatus of claim 31, further comprising: a remote display coupled to the image sensor; a first speaker and first microphone coupled to the image sensor; and a second speaker and second microphone coupled to the remote display, wherein the first and second speakers and first and second microphone form a two-way transmission link between the image sensor and the remote display. (Teleconferencing is a two way transmission link.)

Claims 30-38 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar and Gabriel in view of US Patent 6,226,035 to Korein.

[claim 30]

Nayar and Gabriel teach the apparatus of claim 14. While it is unclear as to what shape Nayar's reflector is, i.e. the equation that defines it is not that of a parabola nor a sphere, it does resemble that of a hyperbola and it satisfies the single viewpoint limitation see Nayar column 9 lines 49-53, never the less at the time the invention was made, as admitted by the applicant in his own specification, it was well known in the art that a hyperbolic could be used to view a panoramic scene from a single viewpoint, and has already been in use for such an application, see Korein column 9 line 59 wherein he teaches the use of a hyperbolic mirror.

Therefore at the time the invention was made, it would have been obvious to one of ordinary skill in the art to use a hyperbolic mirror in the invention of Nayar and Gabriel since the single viewpoint constraint is satisfied using a hyperbolic mirror.

[Claims 31, 38 and 44].

Nayar teaches an imaging apparatus for generating a two dimensional image, comprising:

A reflective mirror configured to satisfy an optical single viewpoint constraint for reflecting an image scene (Col 9 Lines 49-53).

An image sensor responsive to said reflective mirror and that generates two dimensional image data signals to obtain an omnidirectional image on an image plane (Col 7 Lines 62-65 and Col 10 Lines 56-65); and

A controller coupled to the image sensor, wherein the controller defines a perspective viewing window (Col 9 Line 63-Col 10 Line 19). Nayar further teaches the

mapping of each pixel in the perspective window with a corresponding pixel value in the omnidirectional image on the image plane using the configuration parameters (Col 10 Line 55-Col 11 Line 55 and Col 12 Line 25-35). Nayar further teaches the required transformations (zoom, pan) of the hemispherical scene to produce an image from a view point (Col 9 Lines 31-64, Fig 6). Nayar further teaches the use of a computer which is well known to contain memory (Fig. 1A item 125). Nayar does not specifically teach the memory for storing a mapping matrix for each of a plurality of sets of said configuration parameters in a parameter space, said controller using a said mapping matrix to perform mapping of pixels from said omnidirectional image into said perspective viewing window.

Gabriel teaches the use of matrices to perform transformations such as translation, contraction, expansion, rotation and perspective projection (Col 4 Lines 19-30, Col 7 Lines 5-64). Gabriel further teaches a complex transformation can be produced from the product of simpler ones (Col 6 Lines 29-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to store the matrices of Gabriel in the memory of Nayar in order to perform a transformation without processor intensive calculations.

While it is unclear as to what shape Nayar's reflector is, i.e. the equation that defines it is not that of a parabola nor a sphere, it does resemble that of a hyperbola and it satisfies the single viewpoint limitation see Nayar column 9 lines 49-53, never the less at the time the invention was made, as admitted by the applicant in his own specification, it was well known in the art that a hyperbolic could be used to view a

panoramic scene from a single viewpoint, and has already been in use for such an application, see Korein column 9 line 59 wherein he teaches the use of a hyperbolic mirror.

Therefore at the time the invention was made, it would have been obvious to one of ordinary skill in the art to use a hyperbolic mirror in the invention of Nayar and Gabriel since the single viewpoint constraint is satisfied using a hyperbolic mirror.

[claim 32]

Nayar further teaches the imaging apparatus of claim 31, wherein the reflective mirror creates a one-to-one correspondence between pixels in the omnidirectional image and pixels in the perspective viewing window. (Col 10 Lines 20-31.)

[claim 33]

Nayar further teaches the imaging apparatus of claim 31, wherein the controller maps the omnidirectional image to the perspective viewing window by mapping each pixel in the perspective viewing window with a corresponding pixel value in the omnidirectional image. (Col 12 Lines 25-34)

[claim 34]

Nayar further teaches the imaging apparatus of claim 14, wherein parameters defining the perspective viewing window include at least one of a zoom distance defined as the distance from the focal point of said reflective mirror to said window, a pan angle defined as the angle between the x axis and a line through the focal point of said reflective mirror perpendicular to the x-y plane and a tilt angle defined as the angle between the x-y plane and a vector normal to the perspective viewing window. (The

Examiner is assuming that this claim was supposed to be dependent from claim 31 not 14. In either case see (See Nayar column 10 lines 55-65).

[claim 35]

Nayar further teaches the imaging apparatus of claim 34, further comprising a user interface through which a user enters data corresponding to at least one of a desired zoom distance, pan angle, or tilt angle. (Col 7 lines 62-65)

[claim 36]

Nayar further teaches the imaging apparatus of claim 31, wherein the controller generates a mapping matrix by applying a ray tracing algorithm to each pixel in the perspective viewing window to determine a corresponding reflection point on the reflective mirror and then projecting each reflection point to a focal point of the image sensor to determine the corresponding location on the omni directional image. (Figs. 4, 5 and 6)

[claim 37]

Nayar further teaches the imaging apparatus of claim 31, wherein the perspective viewing window is a panoramic viewing window. (Col 11 lines 25-30)

Claims 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, Gabriel and Korein as applied to claim 31 above, and further in view of US Patent 5,790,181 to Chahl et al. and US Patent 3,988,533 to Mick et al.

[claim 39]

Nayar, Gabriel and Korein teach the apparatus of claim 31 as shown above. Nayar and Gabriel further teaches the use of the system for surveillance purposes

(Nayar: Col 1 Lines 25-30, Gabriel: Abstract). Nayar and Gabriel do not teach the use of motion detection.

Chahl, while he is not specific as to his motion detection means, clearly teaches that motion detection can be done in a panoramic surveillance system (Col 6 Lines 25-32). However, he does not specify how he does his motion detection. However, at the time the invention was made, it was well known in the art of surveillance, that in order to detect video motion, the conventional way was to compare subsequent video images and if a large enough difference in the images is detected, it is considered motion. As proof of the Examiners statements he includes Mick, see abstract.

Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art, to include motion detection capabilities of Chahl and Mick in the system of Nayar, Gabriel, and Korein in order to adapt it for use in the surveillance application as Nayar says it can be used for.

[claim 40]

Chahl further teaches the use of activating an alarm if at least a portion of the residual image exceeds a predetermined threshold (Abstract). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the alarm activating method of Chahl in order to notify security of an anomaly such as an intruder.

Claims 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nayar, Gabriel and Korein as applied to claim 31 above, and further in view of US Patent 5,686,975 to Baker.

[claim 41].

Nayar, Gabriel, and Korein teach the apparatus of claim 31. Nayar suggests the use of the method for teleconferencing (Col 1 Line 26). Nayar and Gabriel do not teach detecting a location of a sound source in the image scene; and adjusting the perspective viewing window based on the detected location of the sound source.

Baker discloses a teleconferencing imaging system that includes a panoramic imaging means including an audio detection circuit that can locate the source of a sound and image it (Abstract). Therefore, at the time the invention was made it was well known in the art, that imaging the source of a sound was desired, thus it would have been obvious to one of ordinary skill in the art, to include the audio detection system disclosed by Baker into the imaging apparatus of Nayar, Gabriel and Korein for use with teleconferencing.

[claim 42]

At the time the invention was made, use of the internet for transmitting images was well known in the art. Once the image is processed as in the case of the current invention, data is data, therefore it doesn't matter that the image came from an omni-directional imaging means. Never the less, while Nayar, Gabriel and Korein are silent on the use of the Internet, Baker teaches that teleconferencing involves transmitting both the audio and video data to a remote site for viewing (Col 1 Lines 16-17).

Since teleconferencing implies use of the phone system, and access to the internet is achieved via the phone network, it would have been obvious to one of ordinary skill in the art to transmit the image via a server or any computer capable of handling the job in order to provide a suitable teleconferencing system.

[claim 43]

The imaging apparatus of claim 31, further comprising: a remote display coupled to the image sensor; a first speaker and first microphone coupled to the image sensor; and a second speaker and second microphone coupled to the remote display, wherein the first and second speakers and first and second microphone form a two-way transmission link between the image sensor and the remote display. (Teleconferencing is a two way transmission link.)

(10) Response to Argument

In response to the Appellant's arguments related to claims 1-6, it is noted by the Examiner that this argument was originally responded to in the Final Rejection mailed on September 21, 2005 as cited below:

In regards to the applicants arguments related to the rejection of claims 1-6, 14 and 16-23, the applicant argues that Glatt does not teach the "mapping of pixels from an omnidirectional image into a perspective window as claimed. Rather, Glatt is merely teaching selecting or fetching specific pixels, without any mapping, distortion correction or other processing, to simulate panning and tilting." As shown in the previous Office Action, Nayar teaches the mapping from the omnidirection (which is hemispherical) to cartesian coordinates using calculations (Col 11 Lines 7-9). Nayar is lacking the use of look-up tables for the mapping. Glatt teaches the mapping from a fish-eye lens (which is hemispherical) to cartesian coordinates using a look-up table (Col 8 Lines 28-43). As taught by Glatt, this mapping is in order to present an image as if it had been formed by the panning and tilting of a normal camera (Col 8 Lines 40-43). As omnidirection and fish-eye lens are both hemispherical it would have been obvious to adapt the look-up table of Glatt to be used by Nayar in order to display an image as if it had been formed by the panning and tilting of a normal camera as taught by Glatt.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5

USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, as shown above, both Nayar and Glatt teach the conversion of pixels from a hemispherical image to a normal camera image. Therefore it would have been obvious to one of ordinary skill to use method of look-up tables as taught by Glatt in order to simplify the mapping in Nayar. In regards to the applicant's specific argument related to claim 2, the look-up tables of Glatt are used only to present that it was well known in the art to use look-up tables in order to map pixels from a hemispherical image to a normal camera image. By using this known technique the calculations used in Nayar could be simplified by the use of look-up tables. Therefore the look-up tables would be based on the configuration parameters of Nayar.

To further clarify the Examiner's position, Glatt is used only to teach the use of a look-up table in order to simplify the transformation of a hemispherical image to a normal camera image.

The Appellant argues that Glatt does not teach or suggest how mapping would be performed using a look-up table for an image that comes, not from a fisheye lens, but from a reflective mirror. Appellant further argues, the mapping function of Glatt cannot be imported into the system taught by Nayar because Nayar does not operate on an image produced with a fish-eye lens. It is not the intension of the Examiner to suggest that the look-up table of Glatt can be imported into the system of Nayar. It is the intension of the Examiner to use a look-up table (as taught by Glatt) with the system of Nayar in order to provide a means to translate the hemispherical image into a normal camera image without continuously having to perform complex calculations.

Specifically, Glatt teaches populating the look-up table (LUT) with the pre-calculated coordinates for the fisheye image (Col 8 Lines 34-37). These coordinates are calculated using complex equations (equations 9 and 10 of Col 8). Nayar teaches the use of continuously calculating the coordinates as depicted in the program of

Appendix I. It would have been obvious to one of ordinary skill in the art to pre-calculate the coordinates of Nayar and store them in a look-up table as taught by Glatt in order to prevent the need to continuously perform complex calculations when converting a hemispherical image into a normal camera image.

In regards to arguments related to claims 2, 3, 18, 19, 34 and 35, the Appellant states that Nayar and Glatt fail to teach or suggest the claimed configuration parameters including a zoom distance, pan angle, and tilt angle as claimed. It is noted by the examiner that the claims only require at least one of the configuration parameters. It is noted in the Final Rejection that Nayar teaches the use of a zoom feature. This zoom is further defined by Nayar using Figure 6 (Col 8 Lines 31-41). Glatt further teaches the use of zoom distance, pan angle and tilt angle parameters (Col 7 Lines 40-46 and Col 8 Lines 4-15). These parameters are well known in the art for use with converting hemispherical images to normal camera images as shown by Nayar and Glatt.

In regards to the arguments related to claims 4, 5, 20 and 36, Nayar teaches the mapping steps as shown in Figures 4-6 (Col 9 Line 63-Col 10 Line 30).

In regards to the arguments related to claims 14, 16-23, 31-38 and 44, the Appellant states that Gabriel does not teach a mapping matrix for each of a plurality of sets of configuration parameters. This requirement is very broad and is interpreted by the examiner to be a mapping matrix for each configuration parameter. Therefore, each set contains one configuration parameter. Gabriel teaches the importance of four special cases of transformation matrices (translation, scaling, rotation and shearing)

which can be combine to perform any desired transformation (Col 7 Lines 5-64). Thus, by storing these four matrices any transformation can be performed.

The Appellant further argues the use of matrices of Gabriel with a method using omidirectional image acquired with a "reflective mirror". This argument was responded to in the Final Office Action mailed September 21, 2005 as noted below:

In regards to the applicants arguments related to claim 14, the applicant argues "Gabriel does not teach or suggest anything regarding omnidirectional images and, consequently, cannot teach the claimed memory with mapping matrix for mapping pixels from an omnidirectional image to a perspective viewing window." Gabriel teaches the use of simple matrices used to perform complex warping of images such as to a fish-eye image (Col 4 Lines 24-67). The ability of Gabriel to convert from a normal image to a hemispherical image would inherently mean that the use of the matrices may be used to convert from hemispherical image to a normal image, as such in operation would be the inverse of the warping. Again, as with Glatt, Gabriel is used to show a known method in the art for converting pixel coordinates. Therefore it would have been obvious to one of ordinary skill in the art to use the simple matrices of Gabriel in order to produce the complex transformations of Nayar without processor intensive calculations.

Further, it has been shown above that both fish-eye images and omindirectional images are both hemispherical and therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings for converting one hemispherical type image to a normal image for converting another type of hemispherical image to a normal image.

In regards to claim 38, the Appellant argues that Nayar, Gabriel and Korein fail to teach or suggest memory containing a predetermined mapping matrix for every set of configuration parameters. Assuming every set contains one configuration parameter, it has been shown above that Gabriel teaches the use of a matrix for each of the four

Art Unit: 2621

configuration parameters needed to perform any type of transformation (Col 7 Lines 5-64).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

Art Unit: 2621

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Erick Rekstad

Conferees:

Mehrdad Dastouri, SPE

James Groody, SPE

Mehrdad Dastouri
MEHRDAD DASTOURI
SUPERVISORY PATENT EXAMINER
TC 2600

Groody
James J. Groody
Supervisory Patent Examiner
Art Unit-262-2621